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NUCLEAR POWER

China, U.S., Russia Cooperate in Nuclear Power Technology Usage

936B0090C Beijing KEJI RIBAO [SCIENCE AND TECHNOLOGY DAILY] in Chinese 3 May 93 p 1

[Text] The Wuhan General Simulation and Control Engineering Company, a joint venture of China, the United States, and Russia, was recently put into operation in High Technology Development Park in Donghu, Wuhan. This is a powerful combination of the latest international nuclear technology and it is very significant to the commercialization of China's nuclear power simulation technology.

The three partners to the joint venture represent the pinnacle and authority in nuclear power engineering and control technology in their respective countries. In China, the China Nuclear Power and Dynamics Research Institute is the only institute in this field in China. The American partner, S3T Company, was the first company in the world to develop simulation technology. The Russian partner, the All-Russia Nuclear Power Research Institute, has successfully manufactured all nuclear power simulators and analyzers in Russia. The combination of the three partners will make it possible for all three to develop further their own technology and asset superiority.

World Bank Loan for Nation's Biggest Pumped-Storage Station

936B0086C Shanghai JIEFANG RIBAO in Chinese 20 May 93 p 1

[Article by Hu Weiqiang [5170 0251 0730]]

[Text] Recently, the Tianhuangping pumped-storage power station was approved by the World Bank and received a loan for US$300 million which will be used primarily for buying the main generator units, controls, and electrical facilities.

The Tianhuangping pumped-storage power station is the largest station of this type with the highest water head ever approved by the State Council. Six 300MW reversible-pump turbines will be installed for a total installed capacity of 1,800MW. A total of 3.5 billion yuan will be invested in the project by the China Energy Investment Corporation, Shanghai Municipality, Jiangsu, Zhejiang, and Anhui Provinces, and the Huadong Electric Power Group Enterprise, including the US$300 million loan from the World Bank. The station will pump and store enough water to generate 4.286 billion kWh annually, and will directly generate 3.16 billion kWh annually.

Implementation of Plan To Develop Energy Resources of Northwest Under Way

936B0094A Beijing RENMIN RIBAO OVERSEAS EDITION in Chinese 15 Jun 93 p 2

[Article by Liu Rongqing]

[Excerpt] In the 1990's China will devote great effort in the development of energy resources and industrial raw materials in the northwest. The priorities are coal, crude oil, electric power, nonferrous metals, and petrochemicals.

It was stipulated in the economic development plan for the northwest region, recently approved and put into effect by the State Council, that the central government will increase its investment in the northwest region by 7.85 billion yuan during the Eighth 5-Year Plan; 70 percent of the increase will be used on energy and raw material development. In the Ninth 5-Year Plan the capital construction investment in Shaanxi, Gansu, Ningxia, Qinghai, Xinjiang, and Tibet will still be concentrated on the four areas of energy, raw material, water conservancy, and transportation.

China's northwest region is rich in resources and the distribution is concentrated. In the six provinces and regions of Shaanxi, Gansu, Ningxia, Qinghai, Xinjiang, and Tibet, the verified reserve of coal, oil, and natural gas are respectively 27, 15, and 16 percent of the national total; the long-term reserves are substantial. Water resources that can be developed account for 27 percent of the national total. Verified reserves of nickel, copper, potassium, magnesium, and lead/zinc are respectively 75, 27, 90, 99, and 17 percent of the national total. The northwest region is therefore endowed with the natural conditions to become a major energy and raw materials base.

With regard to the development of energy and industrial raw materials in the northwest region, China policy calls for a major effort in thermal power, active effort in hydropower, a transition from exporting primary products to exporting high-quality energy, accelerated prospecting and development of oil and gas in Xinjiang, Shaanxi, Gansu, and Ningxia, and preparation for the development of large-scale oil and gas fields. The coal industry will put its development priority on the Shenfu and Huangling coal mines in Shaanxi, the Lingwu coal mine in Ningxia, and the Huating coal mine in Gansu, and the preparatory front-end work for developing the Bingchang coal mine in Guanzhong, Shaanxi. Priorities in oil and gas development will be the Uygur, Turpan, and Hami basins in Xinjiang and the Shaanxi-Gansu-Ningxia basin. The emphases in the nonferrous metal industry will be the electrolysis of aluminum, the development of aluminum works in Shaanxi (to electrolyze 120,000 tons of aluminum), the phase II project of Qingangxia aluminum works (to electrolyze 100,000 tons of aluminum), and the phase II project of the Baiyin aluminum works (to electrolyze 50,000 tons of aluminum). Aluminum and magnesium will be developed in Qinghai. The priorities in the lead and zinc industry will be the development of lead and zinc refineries in the northwest and the lead and zinc mines in Changba in Gansu, and Qiantongshan in Shaanxi. [passage omitted]

Optimizing China's Energy Structure

936B0081A Beijing ZHONGGUO NENGYUAN [ENERGY OF CHINA] in Chinese No 4, 25 Apr 93 pp 5-6

[Article by Lai Jian [6351 1017], member of the Senior Advisory Committee, Ministry of Energy Resources]

[Text] There are those who believe that China has an inferior energy structure because it is based on coal, and the structure should be changed in keeping with the rest of the world, which is based on oil and gas, and that "consideration should be given to importing large quantities of energy, especially energy of superior quality to replace coal." That might be all right for those areas that don't have coal and do have the means to get foreign exchange and import commodities, but for the most part, it is a bad policy. The determination of the country's energy structure should first take into account the country's own resources, and look to modern technological advances to raise the quality of energy. Using coal in the traditional way will surely create a serious pollution problem, but if new technology is applied, then a whole new picture emerges. Raw coal should be washed and the fine coal then made into synthetic gas, then the synthetic gas should be used to produce electricity and various chemical products, such as ammonia and gasoline; and the coal slurry and waste from the washing could be used as fuel in fluidized-bed boilers, and the cinders could be used in building materials; and sulfur can also be gotten from the gas purification process. Systematic planning, rational and scientific use of coal not only can clean up the environment, but can bring greater benefits for China's economic development. The U.S. Department of Energy issued a revised handbook in January 1991, "Clean Coal Technology—The New Coal Era," which asserts, "New advancements in clean coal technology can guarantee continued use of an abundant resource and meet U.S. requirements for a clean environment." Its chief advocate, Chief of the Fossil Energy Department, Robert Keante [5146 3676 1422], at the "International Conference on Coal and the Environment", held in December 1991, said, "The development of the new and improved technology can make coal fulfill the requirements for economic growth and improve the quality of the environment," "The development of clean coal technology will promote diversification of the supply of energy, and will eventually erase doubts about coal and change the misconceptions many have about coal." China is especially rich in coal. Statistics from 1989 confirm reserves to be third largest in the world at 166.1 billion tons. That surely should not be disregarded in thinking about the energy structure, and the experience of other countries should be followed. China must certainly not "let China's economic development drift away from the dominant world economic system," but it also can't let the substance of its energy structure rely too heavily on the international market, and must not arouse international reactions that could lead to sanctions and blockade. China must make full use of its abundance of coal and hydropower, must promote wide use of new technology, must develop new energy to optimize its energy quality and perfect the energy structure.

Much R&D on clean coal technology has been done, and some achievements have been put to use. In the area of electric power generation there are:

—Conventional power plants with dust and sulfur removal facilities

—Normal pressure and pressurized fluidized-bed combustion systems

—Integrated gas circulating generator (IGCC)

—Combination gas fuel cell and IGCC unit power generator

U.S. electric power organizations have evaluated these technologies from the standpoint of efficiency, utility, toxic emissions, and economy: giving ordinary power plant coal burners with smoke and sulfur removal facilities a rating of 1.0, then the normal pressure fluidized-bed was 1.11, the second generation pressurized fluidized-bed was 1.16, the first generation IGCC was 1.17, and second generation IGCC was 1.23.

The fuel cell provides clean and quiet electricity that is basically smokeless, and the sulfur dioxide and nitrous oxide gases emitted are one measure below the standard stipulated by advanced countries; and it emits less carbon dioxide than the IGCC, which eliminates 96.4 percent of the carbon dioxide; the fuel cell takes out 97.4 percent. Its efficiency is well above the Carnot thermodynamic cycle which has a theoretical maximum of 80 to 85 percent, and it has a wide range of applications. It requires only 30 seconds to switch power from zero to maximum power, and its load adjustability makes it extremely useful. It can be used singularly or in combinations, which can be used in ships and vehicles, and is an ideal installation in large-scale power plants. Earlier fuel cells were used only under special circumstances, and they burned hydrogen. Now, natural gas, coal gas, and other hydrocarbons or alcohol compounds high in hydrogen can be used, and that is attracting a lot of attention. The U.S. and Japan are doing a lot of research on this and the U.K., Germany, Italy, the Netherlands, Denmark, Sweden, Switzerland, and Finland, not willing to fall behind, are organizing a "European Fuel Cell Group" (EFCG). A practical phosphoric acid fuel cell (PACF) has come out that is already being used in the U.S. and Japan. R&D is now being done on a molten carbonate fuel cell (MCFC), a solid oxide fuel cell (SOFC), and a proton exchange membrane fuel cell (PEMFC).

The best way to use coal is to gasify it, and use that to produce electricity, chemical products and gasoline. That would cut down on pollution and raise its efficiency, optimizing its economic and social benefits. It's just that China has paid it little mind, and there is a reluctance to spend the money to modernize for gasification. Its use for generating electric power compared

with hard coal is very low, only 25.6 percent in 1988, while in the U.S. in the same year it was 85.8 percent.

Water power is clean, can be re-used, and China leads the world in water resources for hydropower, but in 1990, only 6.56 of China's hydropower resources were developed, and that is not only lower than the U.S., Japan, Italy, Germany, France, and Norway, but even India, a third world country, which was 12.8 percent in 1989. Fortunately, the Three Gorges project has already been approved by committee and very soon "tall gorges will become a flat lake". Several other large-scale hydroelectric projects have been started, and it is hoped they will be completed soon.

Harnessing tidal energy is another source of power. According to a survey conducted by the Ministry of Water Conservancy and Electric Power in 1981, there are 191 locations where such water power resources of 500kW or more are available that could generate an annual electric power output of 61.9 billion kWh, at an installed capacity of 21,580MW, and in provinces that lack coal such as Zhejiang and Fujian water power is especially abundant, having a total output capability of 54.73 billion kWh per year at 19,120MW of installed capacity. Small test power stations have been built in Shandong, Zhejiang, and Fujian, and they should provide useful summary experience in the operation and manufacture of such installations, and the development of large-scale tidal energy power stations should be considered. It would be very beneficial to consider, along with local economic development and transportation construction, building large-scale tidal energy power stations at Zhapu in the mouth of the Qiantang Jiang, and at Fuqing Bay and Dianhua Bay in Fujian.

Certainly there is a need for more oil and gas, and it is hoped that more oil and gas resources will be found. The volume of confirmed reserves is not great; reserve output varies between 24 and 69 years, as compared with 152 years for coal (by 1990 statistics), which is quite a bit lower. Oil and gas are good fuels, and they are directly convertible to many chemical products, and from the aspect of economic gains, they should be more used to manufacture chemical products. It is estimated that the number of vehicles could double in China by 2000, ant that will seriously jack up the pressure for oil. The solution is to save oil, and look for substitute fuels, and it would be best to develop electric cars. That would save on petroleum and improve the environment. The source of 60 percent of the pollutants in many major cities around the world is vehicle emissions, and that has led them to pursue the research and development of electrically powered vehicles.

Nuclear energy has just gotten started in China, and the Ministry of Electric Power's development policy, and near-term (2000) and long-term (2015) plan is to give nuclear energy prominence and to have an installed capacity of 4,100MW by 2000 and 30,000MW by 2015. That is certainly good news, but since the planned installed capacity for the whole country is to be between 480,000MW and 580,000MW by 2015, the proportion of nuclear power would still be only 5.17 to 6.25 percent. From the standpoint of technology, the efficiency of the pressurized water reactors now in use is low and high-temperature gas-cooled reactors, and quick reactors must be developed to make full use of uranium resources. Of course, it is hoped that a breakthrough in nuclear fusion will come soon, but it may take a long time. Wind, solar, biomass, geothermal energy, and such renewable energy sources are getting much attention, and China is also doing R&D in those areas. Such sources are widely dispersed, and it is difficult to concentrate them, and make them into a primary source of power. But in China's vast agricultural and pasturage regions and other areas with special conditions, it is worthwhile to extend their use. Continued manufacture of such installations must be assured, and every effort should be made to make them practical.

In summary, to optimize China's energy structure, emphasis must be fixed on what China has, and S&T must be applied to that, and the fact that coal and hydropower are China's great strengths must be publicized, more investment put into them, and more forces effectively marshalled for them.

Shengli Developing Substitute Production

936B0094B Beijing RENMIN RIBAO OVERSEAS EDITION in Chinese 12 Jun 93 p 2

[Article by Hou Yanfeng]

[Text] The substitution production of agricultural and commercial products at Shengli oil field has enjoyed prosperous growth; a new situation of diversified operation has taken shape.

Shengli oil field, started 29 years ago for large-scale oil development, is China's second largest oil field. In recent years, while steadily developing oil and gas, Shengli oil field made a major effort to develop the regional economy and substitution production. Since last year, Shengli oil field started 15 companies under the jurisdiction of the bureau, including the International Economic and Trade Company, the Enterprise Development Company, and the Daming Group. To date, there are about 900 companies engaged in various types of business in Shengli oil field. These economic entities took full advantage of the oil field technology and the high concentration of technical personnel, and contributed to the economy of the oil zone. Businesses under development include oil machinery, petrochemical, synthetic fiber and textile, construction material, agricultural product reprocessing, transportation, foreign trade, foods, tourism, insurance, communication, and consulting. In 1992 there were 1.5 billion yuan of diversified operation in Shengli oil field; the estimated value by the end of the Eighth 5-Year Plan is over 4 billion yuan.

As the main oil business is opened to the outside, the pace of economic and technical cooperation has accelerated at Shengli oil field. So far, the oil field has established joint venture and cooperation relationship with more than 20 countries. Almost 100 projects have foreign investments and the total volume of contract investment is $291 million. Shengli oil field has also actively cooperated with local industries in the oil zone and in Shandong Province. There were also 57 joint operations with business in other provinces. In 1992, Shengli oil field exported $9.96 million of products, not counting the main product of crude oil.

Plan To Adjust Onshore Oil Production

936B0094C Beijing JINGJI RIBAO [ECONOMIC DAILY] in Chinese 24 May 93 p 5

[Article by Xiao Xe]

[Text] According to information released in a meeting in Beijing yesterday by General Manager Wang Tao of the China General Oil and Gas Corporation, China's onshore oil industry, after a plan adjustment, will meet the original goal set in the Eighth 5-Year Plan for producing 140 million tons of crude oil. By 1995, China's onshore oil output will reach 145 million tons and the natural gas output will be 7 billion cubic meters.

Wang said that, based on the situation of an accelerated national economy, China has adjusted the rate of national economic development to 8 to 9 percent for the last 3 years of the Eighth 5-Year Plan. Hence, the original 2 to 3 percent growth set for the oil industry cannot meet the rapid growth in the national economy. The oil industry must therefore speed up the pace of prospecting, increase the amount of verified oil and gas as fast as possible, and try to meet the original target for oil and gas production in the Eighth 5-Year Plan 2 years ahead of schedule.

To achieve this goal, Wang looked at the development history of foreign and domestic oil industries and believed that the oil industry must seize the good opportunity of today. The oil industry must increase its investment in science and technology, greatly promote technological advance, and achieve the greater reserve, production and efficiency through science and technology. To increase the incentive of technical personnel for contributing to petroleum technology, the reward system must be based on the principle of merit. The difference in reward must be increased so that a greater reward can be given to the worker with a greater contribution. The reward system must be perfected and standardized.

Strategic Importance of Accelerating Power Construction in Western Inner Mongolia

936B0071B Beijing ZHONGGUO NENGYUAN [ENERGY OF CHINA] in Chinese No 3, 25 Mar 93 pp 19-22

[Article by Peng Fangchun [1756 5364 2504] of the State Planning Commission and Chinese Academy of Sciences Energy Resources Institute: "The Strategic Importance of Accelerating Electric Power Construction in Western Inner Mongolia"]

[Text]

I.

For a long time, we have failed to solve the power shortage problems of Beijing, Tianjin, Hebei, and the northeast China region and it can be expected that these problems will continue to exist into the future. Moreover, the contradiction between electric power supply and demand in this region may become more acute in the new situation. It should be pointed out that because starting now to accelerate the pace of electric power construction is subject to intense restriction by transportation, the environment, water sources, and many other factors, the construction scale and development pace will also be affected. As for ways to solve this problem, on the one hand we should accelerate the pace of electric power construction in this region and deploy power plants in locations within the region that have the proper conditions; on the other hand we should search for stable electric power supplies outside the region to remove restrictions by multiple factors and ensure sustained development of the region's economy. This article analyzes the feasibility of transmitting significant amounts of electric power to north and northeast China in the short term from the region where Shanxi, Shaanxi, and Inner Mongolia come together (abbreviated below as the "contiguous area"), especially from western Inner Mongolia, and it feels that accelerating construction of an electric power base area in this region has strategic significance for solving the electric power supply problems of these regions.

Besides having abundant coal resources, the region where Shanxi, Shaanxi, and Inner Mongolia adjoin also has very good conditions for the deployment of power plants. The trunk of the Huang He flows through the northern and eastern parts of this region and it has nearby water and coal, which are extremely advantageous conditions. According to preliminary plans, the installed thermal power generating capacity may be about 40,000MW in the near and medium-term and it may become an extremely important electric power base area in northern China that transmits out significant electric power, and it will require 1.26 billion cubic meters of water. According to a possible water supply allocation program prepared by the Huang He Commission in 1987, the 12 provinces, municipalities, and autonomous regions along the Huang He that are related to its water supply will require water supplies of 74.7 billion cubic meters by the end of this century and unified allocations of water supplies can only provide 37 billion cubic meters. In the contiguous region, the possible supplies from Inner Mongolia, Shaanxi, and Shanxi are, respectively, 5.86, 3.8, and 4.31 billion cubic meters, and 1.58 billion cubic meters of their allocated water supplies could be set aside for supply to the energy resource base area. Most of this could be supplied for use

in Shanxi, and would guarantee water supplies for construction of Hequ Power Plant (2 X 3,600MW) and Baode Power Plant (3,600MW). After consideration, construction of reservoirs on the Kuye He and Wuding He in Yulin Prefecture for regulation could provide 300 million cubic meters of water supplies to meet the water use requirements of Shenmu Power Plant (3,600MW) and Yulin's Yuhe Power Plant (2,400MW). At present, the water supply allocation program for Fugu Yinta Power Plant (2,600MW) and Duanjiazhai Power Plant (2 X 2,400MW) along the Huang He can be guaranteed. Western Inner Mongolia is now diverting about 5.5 billion cubic meters of water from the Huang He for its use, which basically balances against the amount of water supplies that it can allocate. However, over 90 percent of this water is used in agriculture. For many years, the Hetao Irrigation Region has used an arrangement involving large amounts of water and slow irrigation that wastes water resources and damages agricultural production conditions and the environment. The Inner Mongolia Autonomous Region Government is now using foreign investments for improvement and upgrading there and has implemented a separation of irrigation and drainage, which will benefit local agricultural production and has great potential for water conservation in that it can conserve at least one-third and more of the water diverted from the Huang He that is being consumed. Thus, the conditions do exist to build Dalad Power Plant (5,000MW), Togtoh Power Plant (2 X 3,600MW), and several other large power plants in the western part of Inner Mongolia. Even more important is that completion of the Heishan Gorge, Wanjiazhai, Longkou, and other key water conservancy projects can regulate the water resources on the northern trunk of the Huang He as well as purify the water sources and improve the quality of water sources and water supply conditions on this section of the river. Implementation of the project to "divert water from south to north" on the lower and middle reaches of the Huang He can free up a substantial portion of the water in the Huang He being allocated as water supplies to Henan (4.31 billion cubic meters) and Shandong (5.54 billion cubic meters) for use in Shanxi, Shaanxi, and western Inner Mongolia in its middle reaches. These things show that the water source conditions in the contiguous region are certainly rather good and that water source guarantees can be provided to this region for construction of an electric power base area. The large coal-fired power plants planned for construction in Inner Mongolia, Shaanxi, and Shanxi at Dalad Banner, Togtoh County, Duanjiazhai, Fugu, Hequ, Baode, and so on are distributed along both banks of the trunk of the Huang He. According to investigations, the contiguous region has at least 40,000MW of installed generating capacity that can be planned for development of thermal power plants and several huge thermal power plants with installed generating capacities of 4,000 to 5,000MW will appear in this region such as Dalad, Togtoh, Hequ, Duanjiazhai, and so on that can build it into an electric power base area with the largest installed power generating capacity in China and a construction schedule that can be lengthened or shortened that is relatively concentrated in a region and that will transmit out significant electric power and produce results quickly. These power plants may enable the local conversion of poor quality coal into electric power after the large-scale development of coal fields in this region, and they can take the coal that is used to generate electricity but which is subject to transportation impediments and use it locally to generate electricity and transmit significant amounts of electric power to load centers. This contribution to the state and society will result in an extreme improvement in energy resource transportation pressures and improve the environmental situation in load centers.

II.

There are superior conditions for the selection of plant sites in the contiguous region of Shanxi, Shaanxi, and Inner Mongolia.

1. The concentrated coal sources, convenient transportation, rational resource utilization, and low power generation costs are rare conditions in the construction of large thermal power base areas in China At present, this region has over one-fourth of China's total available coal resources and most of it is power coal with excellent coal quality. The development of these coal fields has a unique status in China in terms of reserves, output, coal varieties, and quality, and they are irreplaceable. The coal strata are thick and have good preservation conditions and simple structures, so they are easily extracted at low cost. Estimates based on this indicate that the fuel expenditures in this region's power plants are only about one-fourth to one-half those in the load centers of east China. This shows that the price of electricity from pit-mouth power plants that enters grids in load centers is highly competitive compared to building plants in load centers. Thus, there is no need to say that the local conversion of the lower heat value coal from the Jungar and Northern Dongsheng Mining Regions and the large amount of coal in the process of being washed that will be left over after development of the coal fields in the contiguous region into electric power and transmitting the power to load centers will have even better economic benefits.

2. Good water source conditions, water supply guarantees for the deployment of power plants along both banks of the 1,000-li Huang He The trunk of the Huang He flows through the Dongsheng, Jungar, and Shenfu coal fields and large power plants now planned and under construction like Dalad, Togtoh, Hequ, Baode, Fugu, Duanjiazhai, and so on will be deployed along both banks of the Huang He. Precisely as was mentioned previously, all the provinces have potential water supplies from the Huang He that could be allocated by the Huang He Commission that they could exploit, and after the Heishan Gorge, Wanjiazhai, Longkou, and other key water conservancy facilities are completed they can also regulate and purify the water sources on this section of the river and improve the water supply conditions. This shows that

there are water source guarantees for selecting sites to deploy plants along both banks of the trunk of the Huang He.

3. The contiguous region covers a broad land area and the selection of sites here to deploy power plants in general would not take over or reduce the amount of farmland. Moreover, the planned area for the plant regions can be large or small and easily expanded, so there are superior conditions for planning regional power plants This region has a suitable geographic location and is relatively close to load centers in north and northeastern China, so power transmission is economical and convenient. Of even greater significance is the fact that because both the scale and unit installed generating capacity of the power plants can grow to become very large and the power transmission distance is also 500 to 1,000 kilometers, this may enable making the Dalad, Togtoh, Hequ, and other power plants with good conditions and a scale that can be expanded as needed to be planned as an experimental base area for national electric power transmission using modern technical equipment by importing and digesting the world's advanced power generation and power transmission technical equipment and modern management experience to turn them into an integrated experimental base area for tracking advanced world levels including power sources and power transmission and transformation projects to serve electric power capital construction in China during the 21st Century.

III.

Above, we analyzed the power shortage problems of north and northeast China. Calculations indicate that these regions may have a total power shortage of 6,000 to 8,000MW by the end of this century. Western Inner Mongolia, Shanxi Province, and Yulin Prefecture in northern Shaanxi could supply electricity to these regions, so these provinces and autonomous regions can be considered to have competitive capabilities for supplying them with electricity. To date, in comparison only western Inner Mongolia has the best conditions for supplying power to Beijing, Tianjin, Hebei, and the northeast China region.

1. There are clear development objectives for electric power in western Inner Mongolia and accelerated construction would supply sufficient electric power within the region as well as transmit out large amounts of power The Inner Mongolia Autonomous Region is one of the few provinces and autonomous regions in China that does not have a power shortage. Since the connection of the Hu-Bao [Hohhot-Baotou] Grid with the North China Grid in 1989 to supply the Beijing and Tianjin region with electricity from Fengzhen Power Plant, the amount of electricity transmitted from this grid to north China has increased every year. From January to September 1992 it supplied the Bei-Tian-Tang [Beijing-Tianjin-Tangshan] Grid with a total of 1.23 billion kWh of electricity, an increase of 52.2 percent over the same period in 1991, with peak power transmission of 250 to 300MW. Projections indicate that power use loads in this region will grow at less than 10 percent over the next decade while the installed generating capacity placed into operation will increase at a rate of more than 20 percent. By 1995, this region will have an installed generating capacity of about 4,000MW and a power supply load of about 1,800MW, while its installed generating capacity in the year will exceed 10,000MW and its load will be only about 2,700MW. Thus, western Inner Mongolia would have the capability of supplying eastern Inner Mongolia with 1,500MW in 1995 and 6,000MW in 2000. At that time, this region could also supply electricity to the north China and northeast China regions.

2. Sufficient preparatory work, preparations for projects under construction and in the process of construction, many reliable projects that have completed feasibility research or preliminary feasibility research Preparatory work for power plants in western Inner Mongolia is extremely adequate and there is now over 10,000MW in plant sites for power plants for which feasibility research has been completed or is now in progress. The main power plants are: 1) At Fengzhen Power Plant, the first phase with 4 X 200MW which is expected to be completed in its entirety and placed into operation during 1993, and the second phase with 2 X 200MW planned for operationalization and power generation in 1995. 2) Feasibility research for a capacity of 2,400MW at Dalad Power Plant with some leeway for expansion, with 1,200MW in the near term, where construction has already begun on 4 X 330MW, in an effort to place all of it into operation to generate power during 1995; the total installed generating capacity placed into operation at this power plant by the end of this century may reach 2,500MW. 3) Togtoh Power Plant is planned for construction based on one power plant and two stations. The first phase, with either 6 X 600MW or 4 X 800MW has been planned for inclusion as a World Bank loan project and construction will begin in 1995, with at least 1,800MW in capacity being placed into operation by 2000. 4) Haibowan Power Plant has a design capacity of 1,400MW and is expected to place 200MW into operation in 1995 and a total installed generating capacity of 800MW into operation by 2000. 5) Preliminary feasibility research on Daihai Power Plant has been completed and there are plans to construct and place into operation 4 X 300MW by the end of this century. 6) The initial planned capacity for Zhenglanqi Power Plant is 1,200MW and it will transmit power over a distance of about 800 kilometers to Shenyang. It will become an important support point for the transmission of power from Inner Mongolia to northeast China and will place 600MW in capacity into operation by the end of this century. This shows that the main power plants for transmitting power to north China in 1995 will be Fengzhen Power Plant and Dalad Power Plant. The main power plants that will transmit power to north China and northeast China in 2000 are Fengzhen, Dalad, Togtoh, Daihai, and Zhenglanqi power plants.

3. The outline of the 500 kV grid framework for western Inner Mongolia can ensure that abundant power is transmitted out Based on the requirement of transmitting 1,500MW of power to the Beijing-Tianjin region in 1995 and transmitting 4,000MW of power to the north China region and 2,000MW of power to the northeast China region in the year 2000, the proposed 500 kV grid framework is illustrated in Figure 1: 1) In 1995, outside the region we will complete these 500 kV power transmission circuits: two loops from Fengzhen through Shalingzi to Changping and one loop from Fengzhen to Datong; inside the region we will complete two loops from Dalad to Fengzhen; 2) In 2000, outside the region we will complete these 500 kV circuits: two loops from Fengzhen to Tianjin South, two loops from Fengzhen to Fangshan, and three loops from Fengzhen through Zhenglanqi to northeast China; within the region we will complete a third loop from Dalad to Fengzhen, three loops from Togtoh to Fengzhen, one loop from Haibowan to Dalad, and one loop from Dalad to Togtoh.

4. Inner Mongolia has a relaxed investment environment that provides favorable conditions for raising capital to develop power and accelerate the pace of electric power base area construction First of all, the Inner Mongolia Autonomous Region Government has a clear guiding ideology of making construction of an electric power base area the breakthrough point for developing the entire region's economy. Second, it has adopted slanted investments and implemented 8-year contractual responsibility for inputs and outputs for the electric power enterprises under its direct jurisdiction. All of the electric power construction capital that is collected and the profits turned over to higher authorities by electric power enterprises will be returned for use in electric power construction. To raise more capital to develop power, the Inner Mongolia Autonomous Region Government has formulated preferential policies for issuing enterprise bonds and stocks and for attracting foreign capital and compensated foreign investments. Third, the Inner Mongolia Autonomous Region Government is encouraging transmission of power to the north China and northeast China regions and is matching up with power plant construction in making simultaneous arrangements for coal mine construction and actively providing land, water sources, local construction materials, and reserve services for electric power construction. Fourth, based on the need to repay capital with interest, the autonomous region is implementing new prices for new power sources.

5. There has been a high rate of raising capital during the Eighth 5-Year Plan, guarantees have been obtained for achieving the electric power construction plan outlined above, and a foundation has been laid for accelerated electric power construction during the Ninth 5-Year Plan About 2,600MW of installed generating capacity is planned for operationalization during the Eighth 5-Year Plan including a total investment of 7.6 billion yuan in projects for transmitting out power. During this period, the three items of the collected electric power construction capital, returned profits, and depreciation could raise 1.06 billion yuan in capital. Issuing local bonds and stocks, the return of a portion of the profits from the investment by the Hua Neng Company, bank loans, and other forms of capital will amount to 1.51 billion yuan. They will import foreign investments equivalent to 420 million yuan from the Central Bank and Central Credit Group and arrange for loans from the British and French Governments equivalent to 370 million yuan renminbi. The total for these is 3.36 billion yuan which will be added to 3.05 billion yuan in state investments. To date, the amount of capital that has been raised exceeds 84 percent of the required investment. Thus, in terms of the above analysis, the capital required to place into operation the installed generating capacity and outward transmission projects during the Eighth 5-Year Plan is basically guaranteed.

In summary, there are very good conditions for developing an electric power base in the Mongolia contiguous area, and development of this base area has especially important significance for China's energy resource production and supplies. Inner Mongolia Autonomous Region has extremely high enthusiasm for developing power, it has programs and measures, the preparatory work is very sufficient, and it can be expected that plans for the Eighth 5-Year Plan can be implemented in full. Accelerating electric power base area construction in western Inner Mongolia has especially important strategic significance for solving the electric power supply problems of eastern China and alleviating the long-term situation of a shortage of energy resource transportation capacity.

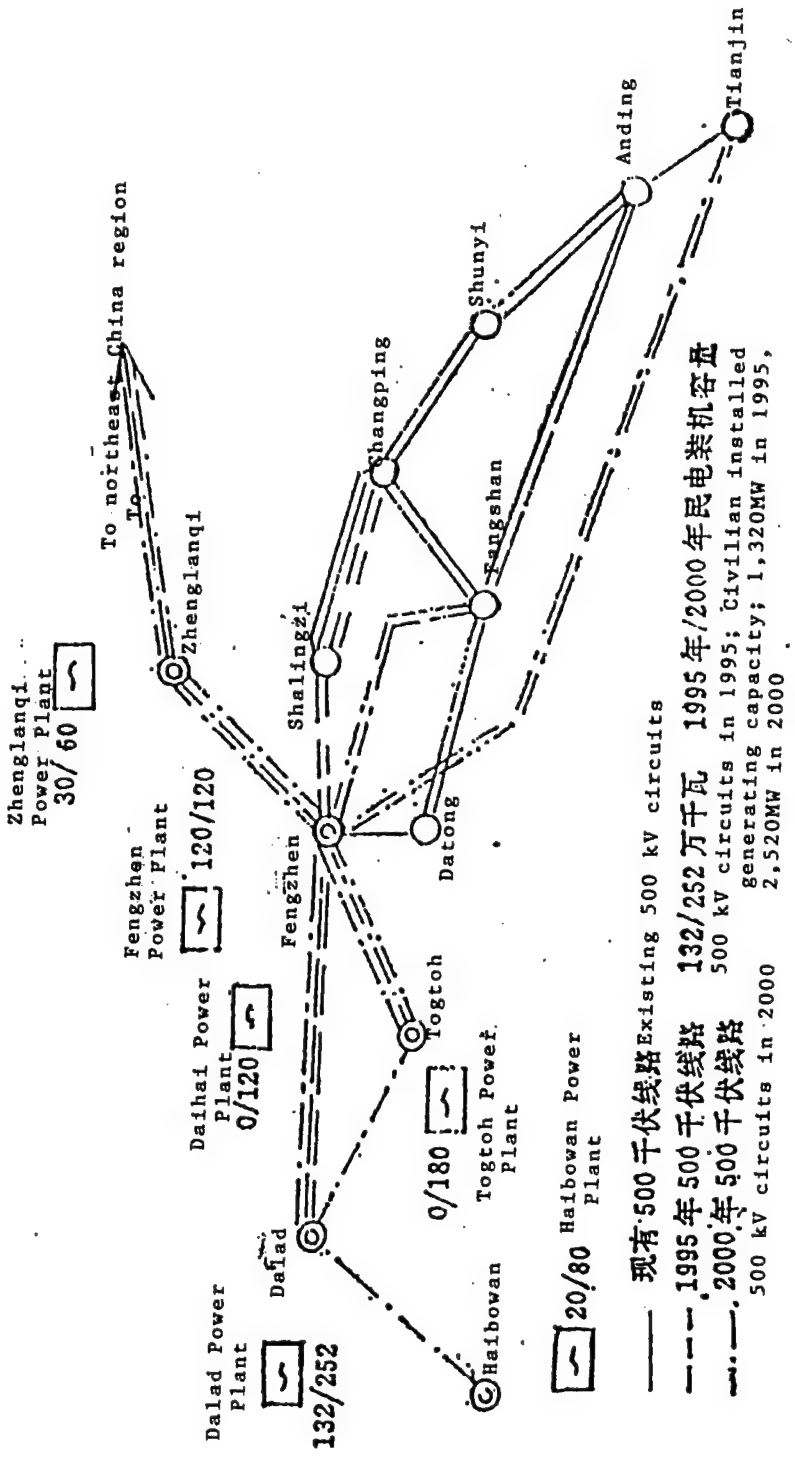

Figure 1. Primary Power Plants in Western Inner Mongolia That Will Transmit Out Power and 500 kV Power Transmission Circuits

Problems in Long-Term Planning of Power Industry to Year 2020

936B0071A Beijing ZHONGGUO NENGYUAN [ENERGY OF CHINA] in Chinese No 3, 25 Mar 93 pp 1-5

[Article by Zhou Xiaoqian [0719 1420 6197] of the Ministry of Energy Resources Comprehensive Planning Department: "Concerning Some Issues in Long-Term Electric Power Planning Work for the Year 2020"]

[Text]

I. On the Issue of Planning Ideas for the Year 2020

A. They must conform to the economic development strategy formulated by the CPC Central Committee, which is the development strategy of taking three separate steps

The overall development strategy for the next 70 years in China is: a first step of doubling our GNP from 1980 to 1990 and solving our food and clothing problems; a second step of doubling once again our GNP from 1990 to 2000 and attaining a relatively prosperous standard of living; and a third step, up to the year 2050 in the mid-21st Century, of attaining the levels of the moderately developed nations and quadrupling our GNP once again. This is the magnificent plot for China's future economic development that was proposed by comrade [Deng] Xiaoping. The first step has already been achieved and we are now striving toward our objectives for the second step. We wish to achieve a universal improvement in people's living standards to the level of relative prosperity, which means attaining a per capita GNP of approximately $1,000 computed at 1980 prices and attaining the levels of the moderately developed countries by the mid-21st Century. Computed at 1980 prices, this would be a per capita GNP of $4,000. This objective can serve as a reference for our research on economic levels in the year 2020.

B. They must conform to the principles of socialist market mechanisms

Preparing programs and plans is an extremely important aspect of market mechanisms. They must obey the law of value, and they must obey the law of supply and demand and conform to the principles of market mechanisms. Concretely speaking, this involves the following areas:

1. Start with market demand, not with planning balance sheets, and matters cannot be dealt with according to the views of leaders at higher levels. This means we must "not simply follow higher authorities or books, but must follow facts." Begin with research on national economic development, population growth, people's living standards, the economic structure, and so on, and start with analysis of resources and conditions to study and forecast electric power and power output demand.

2. We must maintain an overall balance and maintain overall equilibrium of supply and demand in society

3. We must maintain planning from the former establishment of indices and allocation of investments to research on development strategies and research on major principles and policies. Examples include the structure of power sources, power transmission directions among all areas, and equilibrium in communication and transportation and in coal haulage and power transmission; strive for coordinated development of our national economy at the macro level, make plans play their roles in areas like macro regulation and control, comprehensive control, structural regulation and control, economic deployments, and so on, and deal properly with the regulation of major resources and social interests.

4. Shift from only managing things to a focus on management of value states, make changes in price factors, particularly fuel prices and transportation prices, a basic lever for planned regulation of demand for electric power and power output.

5. Planning must break out of enclosed, self-defensive, and small-scale agriculture-type administration, and give full consideration to domestic and international markets and resources. Within the domestic market, investments to build plants and open mines for the transmission of electricity across provinces and autonomous regions and across industries should give full consideration to the utilization of capital and equipment resources in the international market and give full consideration to the development of internationalized administration and foreign investment for resource direction-type enterprises. On the one hand, they should import foreign capital to spur domestic development and on the other hand they should go to foreign countries to develop and establish their own resource and raw materials supply base areas. This is especially true for the coastal provinces, which should organically integrate their export-oriented strategies with the state's overall structural readjustment strategies and use bilateral investments to achieve the dual benefits of profits and inexpensive resources and products.

6. We must boldly import the capital of multinational companies and establish branch companies in China to solve power generation equipment and nuclear power equipment manufacturing problems.

7. The focus of planning is on running electric power enterprises well, pushing enterprises toward the market, and giving enterprises administrative decision-making rights, investment functions, incentive mechanisms, competitive mechanisms, restraint mechanisms, and so on.

C. Electric power must be in the vanguard—this is the guiding ideology for forecasting demand for electric power

China is now in the industrial development stage and in this historical stage electric power must maintain itself in the vanguard. The reasons are:

1. It must adapt to our economic development requirements and meet the needs of our living standards and improving our living standards. Per capita household electricity use in China at present is only 41 kWh and all household electricity use comprises just 7.5 percent of total electricity use (in 1990). This level is very low and there is great demand for electric power.

2. Electric power being in the vanguard is a prerequisite for guaranteeing economic paces and benefits.

3. Calculate electricity supply and demand separately. Forecast demand based on the idea of a "vanguard" and forecast possible supplies based on conditions.

D. Make "electric power the core" in developing energy resources—this is the theoretical foundation for formulating principles and policies

We must adhere to this principle unwaveringly for a long period and not become involved in the theory of multiple cores or a series of foci. This is the foundation for guaranteeing stable development of electric power and the foundation for guaranteeing stable development of our economy. Doing good electric power planning implies having a guidance-type red line that penetrates all the way through economic work to provide an important backbone for the state's development of our national economy. For this reason, we must forecast demand for electric power based on our socioeconomic development requirements and use this to calculate fuel, motive power, and capital as well as arrange coal production, transportation, and construction, not the opposite.

E. There must be a high degree of attention to the issues of environmental capacity and environmental protection

We must look dialetically at electric power development and environmental protection. Developing electric power requires the consumption of energy resources, which has a negative impact on the environment. However, consumption of energy resources is essential for mankind's existence and development and the efficiency of consuming electricity is higher than consuming fossil fuels, which correspondingly reduces consumption of energy resources and protects the environment.

F. We must pay a high degree of attention to energy conservation

The areas of protecting the environment and improving results, having an energy resource equilibrium, and so on all require that we pay a high degree of attention to energy conservation. Thus, power plant construction must foster scale economies, adopt high-efficiency large generators, and focus on upgrading and technical progress for old plants and small generators to improve efficiency and reduce energy consumption. In China's present economic development stage, however, we must combine development and conservation, but development must still be placed in the primary position.

G. Electric power deployments must benefit the rational and effective deployment of energy resources

We must be concerned with scale economies, have relative concentration, and achieve optimized combinations of similar categories of production. We must overcome the phenomena of regional decentralization, closure, excessive numbers of medium-sized and small power plants, and the trend toward assimilation of local industrial structures.

H. There should be diversification of electric power energy resources

There will not be significant changes in our electric power development deployment in which coal is the dominant factor for a long time to come, but we must actively develop nuclear power and make major efforts to develop hydropower, and fuel gas and steam combined cycles which use oil and gas as fuel should also receive attention. We should also give full consideration to developing new energy resources, and new energy resources should account for a substantial proportion of power generation. At present, we should give special attention to the development of wind power.

I. We must reinforce electric power organization and management

Given the history of electric power development in China, especially the situation during several years of reform, and the development of all countries in the world at the present time, provinces should be the entity, provincial electric power companies the nucleus, and network companies the groups for the implementation of unified dispatching for gradually developing national integration based on power grids and the implementation of contractual dispatching among grids. This arrangement may be the basic configuration for the organizational structure of electric power in the future.

J. Unified base numbers

Planning work prior to the year 2000 should have unified calculation standards for the planning period using constant 1990 prices, and the installed generating capacity, power output, and so on based on 1990 should serve as the basic data.

II. On the Issue of Levels During Planning Periods

1. Establishing a development level is the first step in planning and the basis for an overall plan. This requires research on economic development and people's living standards as well as research on the levels that can be provided by resources and other external conditions.

2. Research on economic development levels actually is research on the electric power market capacity question. Research on construction conditions, prices, and other policy questions actually is the question of the supplies that may be provided by the market.

3. Research on overall levels in China and the development levels of each region is a question of the relationship of the local situation to the overall situation, and should be carried out simultaneously, repeated several times, and gradually brought closer. To study national levels, we must understand levels in all regions, and doing research on each region cannot be detached from a foundation of overall national levels.

4. There should be high, medium, and low programs for levels to form a band surface, not a line, and the three programs should include situations that might occur during the planning period. Methods for research on levels should use horizontal comparison and vertical research. Comparison is the same as research, and horizontal comparison means doing research within and outside of provinces and within China and in foreign countries to understand the development of other provinces and study other countries, compare their similar economic development situations and resource situations, do comparative research, and establish several development levels that are selected for their own provinces and regions. Vertical research concerns the economic development history of a region to search for laws and forecast the future. These two methods are used for mutual reference.

5. Projecting electric power and power output should at the least involve using the results of forecasts using three methods: the elasticity coefficient method, value of output unit consumption method, or production unit consumption method for making comparisons and selections.

6. Based on current forecasts by many units, China's total installed generating capacity in the year 2020 will be: 650,000MW, 710,000MW, 800,000MW, 1.045GW, and so on. These may be our three high, moderate, and low levels. Analysis of our present situation indicates that a total installed generating capacity of 700,000MW to 800,000MW by the year 2020 may be the closest. This would include 550,000MW in thermal power, 160,000MW in hydropower, and about 40,000MW to 50,000MW in nuclear power. Stipulating on the basis of this an addition of 20,000MW to 25,000MW in new capacity each year into the future should be said to be possible, and it can serve as the moderate program for levels in 2020. Having 800,000MW in the year 2020 basically can meet the requirements of our economic development pace of 8 percent from 1990 to 2000 and 5 percent from 2000 to 2020, and this pace of economic development should be said to be relatively appropriate.

III. Concerning External Construction Conditions

These mainly include several aspects: coal, transportation, water resources, land, environmental capacity, equipment, capital, and so on.

1. Coal and transportation. Research by several units indicates several programs for total demand for coal in China in 2020: 2.4 billion tons, 2.5 billion tons, 2.6 billion tons, and so on. As for the coal output that can be supplied, based on the results of research on China's coal development strategy for the period 1991 to 2020 done by the Ministry of Energy Resources, 2.15 billion tons is possible, and this can be used as a reference for coal transportation and power transmission equilibrium work. This 2.15 billion tons would mean an increase of 32 million tons a year from 2000 to 2020, which would also leave substantial leeway. The projected average yearly increase of 44 million tons in coal output China during the 20-year period from 1980 to 2000 is 37 percent higher than the earlier projection of an average yearly increase of 32 million tons during the 20 years after 2000, so it can be said that the 2.15 billion tons level does leave some leeway.

There should be comparison of multiple programs for coal transportation and power transmission and comparison of the economy and technical rationality of hauling coal, transmitting electricity, pipelines, and so on to match up multiple programs. There is not enough balance between coal and power. For example, coastal regions can consider importing some of their coal or oil and gas to deal with their problems. Guangdong and other coastal regions can also consider developing coal mines in Australia and the northeast China can go to Russia to develop coal, gas, and hydropower.

2. We have a major equipment problem. For this reason, we must take full advantage of China's manufacturing capabilities and improve domestic manufacturing levels while at the same time studying cooperation with foreign countries and making full use of resources on the international market. We can also consider an arrangement in which we establish branches of foreign companies, especially nuclear power equipment manufacturing plants.

3. The land and water resource problem must receive a high degree of attention. All newly-built power stations must be of a water-conserving and land-conserving type.

4. The resource question. The key is systems and policies. If we truly make electric power enterprises serve as enterprises that follow market mechanisms and principles in the complete sense and if we exert macro control over the total scale of electric power construction so that it does not exceed 2 percent of our GNP, we feel that all the capital can be raised within China and from foreign countries.

IV. On the Issue of Power Grids

Power grids gradually develop and take shape as the electric power industry develops and there are many benefits when grids are integrated that are receiving growing attention. We now set forth many long-distance power transmission issues, all of which concern the question of the relationships among grids. For example, Shanxi has proposed making a shift from simply transporting coal to a combined focus on coal haulage and power transmission the focus of Shanxi's economic development strategy and using this to spur rapid economic development. Similarly, Jiangsu, Shanghai, Zhejiang, and Guangdong have all expressed an interest in electricity from Shanxi, which is also required for the

economic development of these provinces and municipalities. In this type of situation, the question of how to design grid structures to make them safer, more economical, and more rational and make dispatching more flexible is an extremely urgent and important question.

1. Concerning national grid structure principles. The basic idea for the development of China's power grids is to make provincial grids the nucleus for further reinforcement and perfection of the primary grid framework of every large regional grid and build them into powerful receiving-end grids that have unified dispatching. Integrate with development of hydropower and thermal power base areas, gradually achieve integration of all large regions on the basis of mutual benefit and turn them into nationally integrated power grids that implement contractual dispatching. This structural principle is very important for the future development of grids in China and we must continue to do intensive research and discussion.

2. The question of the relationship between long-distance power transmission and power grids. Only discussing point-to-point power transmission and not touching upon the interrelated point-to-grid and grid-to-grid issues is impractical. We must look both backward and forward when doing research on any question of transmitting power from power plants to multiple grids and make long-term calculations that should serve as the beginning of large regional grid integration and do good matching up of target grid frameworks and transitional grid frameworks to fully foster all types of grid benefit issues in grid integration. Thus, the first question is the necessity of truly making good divisions of levels and of regions, to make the levels clear and the structures simple, and configure them with a variety of energy resources to benefit the coordinated development of their energy resources, resources, and environment.

3. Grid integration is accomplished using AC, DC, or mixed interconnections and should be done in all cases in accordance with the principle of technical-economic rationality, reliable power supplies, convenient dispatching, and making future development more convenient.

4. We should study the issue of integrating with grids in adjacent countries.

5. We must conscientiously study the voltage grade issue, the issue of improving our existing 500 kV voltage grade power transmission capabilities, and the technical issues involved in transmitting 20,000MW to 30,000MW of electricity from large hydropower and thermal power base areas such as the ones in northern and southwest China. The focus at present should be on the problem of how to propose power transmission capability questions regarding our existing 500 kV voltage grade for grid structures, corridors, and power transmission technology.

6. Research on developing a national grid should be integrated with programs for transmitting power from the Three Gorges.

V. Concerning the Question of Power Source Structures

1. There will be no change in the configuration of coal being the primary factor in electric power prior to the year 2020 and the proportion will basically be maintained at the 1990 level of about 74 percent, or it may even rise by 2020. An estimated 55 to 60 percent of our coal will be used to generate power in 2020. This proportion cannot be considered high when compared to the United States, England, Germany, and other countries.

2. If the degree of hydropower development attains 160,000 to 170,000MW as mentioned previously, then its overall degree of development will reach about 50 percent. An important issue now is preparatory work to accelerate hydropower development. Besides capital problems, there is insufficient preparatory work, which will be a factor that restricts accelerated development of hydropower.

3. Regarding the nuclear power question, considering that we will require 40,000 to 50,000MW by 2020, the focus is still on coastal regions with shortages of energy resources, so the proportion accounted for by nuclear power should be greater than 10 percent in coastal regions by 2020.

4. We should give full attention to using wind power to generate electricity. Shortages of chemical fuels and serious environmental problems have attracted attention in all areas to renewable energy resources, especially power generation using wind energy, and it is receiving extremely great attention in the United States, Germany, northern Europe, and other countries. The famous Chinese scientist Qian Xuesen [6929 1331 2773] has written a book that proposes using 4 million 500 kW wind power generating devices to solve China's electricity use problems during the next century. The attention in countries to R&D on decentralized power source systems to solve rural power source problems has also attracted our full attention and we have given it full consideration in our long-term plans.

5. Regarding power grid peak regulation power source structures, there should be diversification and comparison of a variety of programs. First of all, we should give consideration to the need for hydropower and thermal power generators to have peak regulation capabilities and then consider pumped-storage generators and the adoption of fuel oil combined-cycle generators in our large coastal cities to deal with peak regulation.

New Power Ministry: Two Main Aims Are Reform and Growth

Investments To Increase

936B0086a Beijing RENMIN RIBAO OVERSEAS EDITION in Chinese 29 May 93 p 1

[Article by reporter Qin Jingwu [4440 0079 0582]]

[Text] The establishment of the Ministry of Electric Power was announced on 28 May. State Council Vice Premier, Zou Jiahua, and other representatives of relevant departments and committees attended the gathering for the event.

Minister Shi Dazhen of the Ministry of Electric Power proclaimed that reform and growth will be the two main aims of the Ministry. Attentive to the needs of the socialist market economic system and the accelerated development of China's economy, China will increase investments in the electric power industry, and empower, as soon as possible, electric power groups and corporations with investment and financial, external business and foreign trade functions, and bring all electric power enterprises into conformity with the Huaneng Corporation's management, investment, and financial system. China will continue to encourage multi-avenue, multi-level, and multi-form means of raising funds for electric power, and applauds inter-regional and inter-departmental liaisons for electric power. China will set a course for reform by implementing a share-holding system on the Shandong grid and Shanghai grid, and find a way to put Pudong electric power operations on track with the international market.

Vice Minister Shi said that in the 1st quarter of this year national electric power output increased by 9.7 percent increase over the same period last year, while the national total output value grew 22.4 percent. For the electric power industry to lead the way effectively it must increase the annual rate of investment, use foreign funds, test the share-holding system, set rational prices for electricity, and convert the enterprise management system, then it can develop at an extraordinary rate, and then it will be capable of fulfilling the needs of the rapidly growing economy.

Drafts Strategy for Reform, Development

936B0086B Beijing GUOJI SHANGBAO in Chinese 16 May 93 p 1

[Article by reporter Li Yinghao [2621 7336 3185]]

[Text] On 8 May, the newly formed Ministry of Electric Power formally hung out a shingle and opened up its doors at 137 Fushi Street, clearly signifying the seriousness with which China regards the "bottleneck" industry.

The reformation and growth of the electric power industry has been remarkable. Since the Seventh 5-Year Plan, electric power production has increased at an average rate of over 10,000MW per year. In 1992, 12,176.8MW of large- and middle-sized units went into production. In nearly 5 years the newly installed capacity increased 60,000MW, or about equal to that of the 30 years prior to reform. By end of 1992, the total installed capacity had reached 165,000MW, generating 747.7 billion kWh per year, lifting China to 4th place in the world. China's electric power industry has entered an era of large networks, large power plants, large units, high voltage, and high automation; and, in 1979, electric power departments began using outside funding for electric power development, there now being 53 cooperative projects for thermal power, hydropower, nuclear power, and power transmission, for a total of 42,000MW. Along the coast there are a number of electric power projects that are Sino-foreign joint ventures or funded solely by foreign interests, such as the Guangdong Daya Bay nuclear power plant, Guangdong Shatoujiao-B power plant, and Jiangsu Ligang power plant. In the last year, notwithstanding the pace of the development of the electric power industry thus far, the nationwide power shortage has basically yet to be solved; the per capita annual output is only just over 600 kWh, about 40 percent of the world average, and there are 120 million agricultural people in China who still don't have electricity.

The Ministry of Electric Power just formed, in its new embodiment, is taking a new direction in reform and development, and with a new work ethic and operating efficiency to accelerate its reform, it reaches a higher ground. Its overall goal in minding the needs of a socialist market economic system and changing functions of government, moving gradually from direct control to macroscopic control of enterprises, is to convert enterprises to economic entities. There will be an effort to get an average of 15,000MW to 17,000MW of newly installed capacity every year in the next 5 years for a 5-year total of 75,000 to 85,000MW of newly installed capacity in order to better supply the electric power needed for an annual 8 to 9 percent increase in total output value of the national economy. By the close of the century, to have essentially reduced the nationwide power shortage, there can be no remaining counties without electric power, and rural electrification will have to be over 95 percent. The efficiency and utility of electric power enterprises must reach a uniform level within the country, and the administration of electric power enterprises must be brought up to or near the international advanced level. In the next 5 years, a strong effort will be made to bring in foreign investments for electric power development to make up for the shortage of domestic funding. The ratio of foreign funds in electric power construction will be raised from one-tenth to one-fifth, importation of foreign advanced electric power facilities will be stepped up, and old facilities in many power plants will be replaced. The price of electricity will be raised to put China's electric power industry on track with the international electric power

market. Shanghai Pudong, Guangdong, and Shandong coastal areas will lead the way in releasing the price of electricity this year.

Power Sector Said Facing Unprecedented Problems

936B0080A Beijing JINGJI RIBAO [ECONOMIC DAILY] in Chinese 8 May 93 p 3

[Article by reporter Xie Ranhao [6200 3544 3185]]

[Text] Authorities of the Ministry of Electric Power are saying that because funding has been materializing at a low rate, electric power construction is facing unprecedented problems this year, and many construction units have expressed alarm to the Ministry of Electric Power, and some have gone to reduced work schedules.

The State Planning Commission's assignments for this year's capital construction for the whole country will be 155 large- and middle-sized electric power projects, 34 new project start-ups, and a total of 11,449.5MW of large- and middle-sized units will go into production this year. Investments in electric power capital construction will be on a scale of 52.92 billion yuan; national funding will be 19.2587 billion yuan (of which, management funds will be 1.6127 billion yuan; received and reloaned funds, 1.071 billions; bank loans, 10.4 billions, and 6 billions in bonds); 3 billion yuan in foreign investments will be used, locally raised funds will be 14 billion yuan, special funding for converting from coal to oil will be 2.1 billion yuan; Huaneng Enterprise Group will invest 4.18 billion, and local projects will get 8.77 billion yuan.

Normally, each year 18 percent of investments should be in place for electric power construction, but because the rate of in-place investments is low all over for various reasons, only 2.57 billion yuan are actually available by the first quarter of this year, only 4.8 percent of the annual plan; and of that, management funds is 373 million yuan, or 22.4 percent of the annual plan; construction bank loans are 1 billion yuan, 11.5 percent of the annual plan; industrial and commercial bank loans are 30 million yuan, 7 percent of the annual plan, and no agricultural bank loans have been received. Returned and reloaned funds in National budget investments are 1.071 billion yuan, but because state investments in electric power projects are based a policy of repaying capital with interest, they are not yet all in place, and it is not easy to get returns back. For a variety of reasons, the 7.3 billion yuan in electric power bonds, which makes up 32 percent of the state investment, have not even been circulated yet, let alone not in place.

It is understood that, to alleviate the situation caused by late in-place investments, the Ministry of Electric Power issued an emergency notification that except for cases requiring scientific work by construction units, shortened construction schedules, lowered building costs, strengthened construction management, and enforced savings, those electric power construction enterprises that are provident and can at the same time carry on construction, may sell part of the construction rights to raise money. But in reality, it is still evident that there is no way to turn around the funds shortage situation.

Vice Minister of the Ministry of Electric Power, Zha Keming, has therefore called for the cooperation of concerned departments to continue actively assisting in raising money for electric power construction, and to strive to get the bank loan part of funding in the first half of this year up to 60 percent of the annual plan, and before the electric power bonds are circulated, let 2 billion yuan in short term loans go to electric power construction units to relieve the serious shortage of funds for electric power capital construction.

Northwest Power Construction Update

936B0078A Beijing RENMIN RIBAO OVERSEAS EDITION in Chinese 13 May 93 p 1

[Article by reporter Jing Xianfeng [2529 7145 1496]]

[Text] The northwest power network which in 1992 set an all-time record for newly installed power capacity, has this year surpassed any single year for investments in electric power construction, over 3.7 billion yuan. These conspicuous records demonstrate the vitality of the development of the electric power industry in the five northwest provinces. Slow electric power development and minimal rural electrification had characterized economic development in the northwest for a long time. Since the Seventh 5-Year Plan, the people of the northwest, having endured the hardship of insufficient electricity, gave priority to developing the electric power industry to narrow the "gap between the east and west", and made it a prerequisite for lifting the economy to new heights. In the 7 years since 1986, the five provinces, while lobbying for national support, made the most of local investment interest, and found various ways to raise money to double the rate of total installed capacity since the end of the Sixth 5-Year Plan. The large- and middle-sized facilities that went into operations last year amounted to 1,750MW of generating capacity.

In the Eighth 5-Year Plan the new generating capacity of the northwest power network will be increased by as much as 5,907MW, more than all the cumulative new capacity seen in the five provinces in the several decades prior to 1985. In line with the new idea of "converting from transportation of coal to transmission of electricity to relieve pressure on transportation," the Northwest Electric Power Administrative Bureau, while building the Lijiaxia hydropower station and other large-scale hydropower stations, is making early preparations to get large-scale pit-mouth power plants operating in the Ninth 5-Year Plan to guarantee a total installed capacity of the network above the 20,000MW mark by 2000.

Inner Mongolia Developing Coal, Electric Power, Gas Resources

936B0075A Beijing RENMIN RIBAO in Chinese 24 Apr 93 p 1

[Article by reporter Ao Teng [0277 7506]]

[Excerpts] [passage omitted] Coal is present on 56 percent of the nearly 10,000 square kilometers of [the Ordos] plateau, an estimated total reserve of over 763 billion tons; 121.2 billions already confirmed, and that is 58 percent of the total reserves in Inner Mongolia and one-sixth of the reserves in the entire country. Jungar coal field, situated on the eastern plateau, is the largest coal construction project in China, with 5,582 square kilometers of unbroken belts of coal-bearing strata with capped seams averaging over 80 meters deep, very suitable for open pit extraction. The Dongsheng coal field in the middle of the plateau has a coal-bearing area of over 40,000 square kilometers with reserves of over 600 billion tons.

Its geological structure, combined with that of the Shenfu coal field, stacks up with the eight leading coal fields in the world. The caloric efficiency of refined coal from this coal field is 7,600 kilogram-calories, with low ash, low sulfur and phosphates, and excellence of quality that will grab a piece of today's international coal market.

"To cook a meal, take a basket, go outside, bend over and pick it up." is what the locals know very well about this coal. It can be lit with a piece of paper, and the coals can be used for a week. Such coal requires no processing to be used as fuel, and it is odorless and smokeless.....taking a drive around, on the cliffs and in the creek beds coal can be spotted everywhere.

Where there is coal, there are its associated minerals. More than 30 minerals are confirmed, and in evidence are limestone, kaolin, granite, marble, asbestos, and ceramic clay, inexhaustible in supply and uses. From the existing resources it can be seen that the eastern Ordos has a rich coal structure, seldom found on earth, and initial surveys at an oil and gas field in the western Ordos place reserves at over 1 trillion cubic meters. Whether in the east or in the west, minerals are everywhere: Glauber's salt, lead, zinc, copper, gold, niobium, and tantalum.

"Led by coal-fired electric power, the full-scale development of the Ordos will follow." The Inner Mongolian leadership, having at last discovered the advantages of the Ordos Plateau, resolutely outlined a policy: let central Inner Mongolia ride this "express train" for the glory of the center and for the benefit of the whole region.

Numerous checks and proofs yield encouraging signs everywhere. The Autonomous Region Party Committee Secretary, Wang Qun, and Chairman of the Regional People's Government, Bu He, have made many personal visits to the energy base to officiate and assist in solving problems. In July, 1990, the long awaited first-stage of the Jungar project was scheduled among the 10 new major national key projects, and also joined the line up of the State Council's 27 energy construction and expansion projects. In December of the same year, at the 7th Plenary Session of the 13th CPC Central Committee, the Jungar project was again given key status and was designated for the westward movement of the national energy industry, and was written into the 10-Year Economic and Social Development Plan and the Eighth 5-Year Plan. [passage omitted]

The Ordos project fully supported by the local population carved out a domain, and formally established a new-style coal, electric power and transportation group enterprise uniting coal, its main focus, with electric power and transportation. A national investment of 4.1 billion yuan made it possible to nurture this "golden cherub."

After 2 years of struggle, the group enterprise invested over 2 billion into the Jungar wasteland, and achieved unprecedented results: a 33.54 million cubic meter open pit mine with an annual production capability of 12 million tons was opened in the 4th quarter this year; and what are being called a "first in Asia", a coal preparation plant, 4 large product warehouses, and 8 large raw coal storages, a raw coal screening and pulverizing system has reached test status; and the Xiaoshawan Huang He water supply project is completed.....

The "Hell bent for leather" pace of the Jungar development, is giving the Dongsheng coal field, with its two-step head start, little rest in the race to keep up. with 2.5 million yuan invested, Dongsheng coal field reached its initial production capacity. There are now large- and medium-sized mines at 11 locations on a scale of 10.2 million tons. Village coal mines have sprung up in over 140 places with an annual product capability of up to 2 to 3 million tons.

Along with all that, early preparations are taking shape for a third major coal field on the plateau, the Wanlichuan coal field. The "Hualian Coal Corporation" jointly managed by the Inner Mongolian Autonomous Region and the Shoudu Steel Corporation has been formed, and is opening up the northern Dongsheng mining district, which will be the raw materials base for the Shoudu Corporation. [passage omitted]

Henan Invests in Major Mining, Power Plant Projects

936B0078B Beijing RENMIN RIBAO OVERSEAS EDITION in Chinese 13 May 93 p 1

[Article by reporter Liu Yaming [0491 7161 7686]]

[Text] Zhengzhou, 13 May (XINHUA)—Central China's major energy resource province, Henan, will invest several billion yuan in construction of the coal, electric power, and petroleum industries. This year, 16 of the 81 national and provincial projects that Henan is involved in are energy projects.

According to the Henan Provincial Government Major Projects Office, besides the four national projects: Pingdingshan mining district, Yongxia mining district, Zhengzhou mining district, and Yanshi power plant now under construction, and among other key provincial projects for this year, are the 400MW Zhengzhou thermal power plant expansion project, the reconstruction project to increase the capacity of the No 6 mine of the Pingdingshan mining district by 1.2 million tons of raw coal, all of which will open up this year. The 700MW installed capacity Yahekou power plant and the 1,200MW installed capacity Qinbei power plant are two large-scale power plants that will also be in early stages of preparation this year.

Henan, an important energy base for China, now has five large-scale coal mining districts: Pingdingshan, Yima, Jiaozuo, Hebi, and Zhengzhou; two large petroleum production bases: Zhongyuan oil field and Henan oil field; and 10 or so large- and middle-sized power plants including: Yaomeng, Jiaozuo, Xinxiang etc. Last year, Henan produced over 90 million tons of coal, second only to Shanxi, and generated up to 40 billion kWh of electric power.

In the Eighth 5-Year Plan the whole province is scheduled for over 3,500MW of increased generating capacity, an installed capacity of up to 9,300MW, generating up to 50 billion kWh of power. The investment environment will continue to improve, and foreign investments will be made for energy development. The Zhengzhou and Hong Kong commercial joint venture construction of the Zhengzhou heat and power plant's two 400MW units is moving along, the Hong Kong side having already decided to fund the construction of one unit. A bilateral agreement for a Spanish Government loan to build two 700MW units at the Yakehou power plant has been signed by both sides.

Sichuan Takes Steps To Resettle Population in Proposed Three Gorges Impoundment Area

936B0084A Chengdu SICHUAN RIBAO in Chinese 6 May 93 p 1

[Article by Liu Yongxiang [0491 3057 3276]]

[Text] The Sichuan Party Committee and Provincial Government have formulated policies and measures to speed up the economic development and population resettlement effort in the Three Gorges impoundment area in Sichuan.

The Sichuan reservoir is the major impoundment area for the Three Gorges project, and it is the only impoverished area along the Chang Jiang. In seizing the moment of the Three Gorges project and the opportunity to develop the Chang Jiang watershed area, the Provincial Committee and Government's "two fronts, two flanks" policy for a rapid economic development of the reservoir zone and successful resettlement will be decisive in bringing the Three Gorges project to a smooth finish. To do this, the Provincial Committee and Government decided to include, in the Eighth and Ninth 5-Year plans, consideration for the development of science, education, culture, sanitation, tourism, and commercial businesses along with transportation, telecommunications, energy, agriculture, water conservancy, chemical industry, building materials, light industry and textiles, and machinery projects. The key to this is a successful economic and technological resettlement and development in the area of Wanxian Municipality and a provincial level tourism and vacation zone along the Chang Jiang from Fuling to Wushan. Hereafter, the Municipality and Prefecture in the reservoir area will enjoy greater economic and administrative authority, and more tax and profit advantages. All provincial level examination and acceptance authority will be granted to the Municipality and Prefecture for all basic and social service facilities, and "San Zi" enterprise projects that had not required provincial level financial and external conditions. Credit, land acquisitions, and commodity price controls will be increased correspondingly. The Wanxian and Fuling Prefecture Tax Bureaus will have the tax advantages and examination and acceptance authority of provincial level organizations. Tax rates will be adjusted for population resettlement and development; new and relocated enterprises will be exempt from income taxes for 2 years, and their taxes will be reduced for 3 years. The province's share of energy and transportation funds received by the reservoir zone, national budget adjustment funds, agricultural land taxes of the resettled and land acquisitions, and foreign exchange will be retained by the municipality, prefecture, and county.

Integrating Control of Cascade Stations on the "Five Gorges" of the Huang He

936B0080B Beijing JINGJI RIBAO [ECONOMIC DAILY] in Chinese 8 May 93 p 3

[Article by correspondent Yuan Linsheng [5913 2651 3932] and reporter Liu Pinyi [0491 7340 1150]]

[Text] Five cascade hydropower stations and reservoirs on the upper Huang He are under integrated control and operations on the northwest network, and are serving primarily for electric power, but also for irrigation, flood control, reducing ice flow, providing water for industries and cities, and they are making a great contribution to the economic development of the northwest.

The Longyangxia, Liujiaxia, Yanguoxia, Bapanxia, and Qingtongxia hydropower stations on the upper Huang He have a combined installed capacity of 3,268MW, 36 percent of the total capacity on the northwest network. The Northwest Electric Power Administrative Bureau, applying a polity of "out with the bad and in with the good through multipurpose use" has integrated the control of the five cascade power stations (and reservoirs), to try to send more power to the network each year. They generate more power in wet seasons, adjust peak loads on thermal power, use thermal power to maintain consistent power in dry seasons and for adjusting peak loads on hydropower. Through reciprocal alignment of thermal and hydropower, the five cascade hydropower stations transmit about 500 million more kWh of power every year, equivalent to that of a 150MW middle-sized power station's entire annual output.

These hydropower stations and reservoirs are very important for agricultural irrigation, controlling Huang He floods, and preventing ice damage, and they have become the reliable protector of agricultural production and the people's livelihood in the area of the upper and middle reaches of the Huang He. In 1969, after the Liujiaxia reservoir began working, .8 to 1.2 billion cubic meters of water is retained up until May of each year, raising the rate of water retained for use in the springtime for the Gansu, Ningxia, Inner Mongolia - the "Huang He irrigation zone" - from 65 percent up to 100 percent, and the area of irrigation increased from 10 million mu in 1968 to 18 million at present, and the annual production of foodstuffs has been increased by approximately 1.5 million tons.

These cascade hydropower stations and reservoirs have reduced the flow of floodwaters at the Lanzhou Huang He channel from the natural 8,080 cubic meters per second of the last hundred years, down to a safe channel flow of 6,500 cubic meters per second.

The integrated control and operation of the five cascade stations on the upper Huang He also fully supplies cities like Lanzhou with water for industrial use. In the past, the channel flow of the upper Huang He during dry seasons was only 100 cubic meters per second, and that has increased to no less than 300 cubic meters per second. It has also saved coal resources for the northwest area, reduced transportation pressures, reduced environmental pollution, and created enormous comprehensive benefits.

Fujian Making Strides in Development of Small, Medium-Scale Hydropower Resources

936B0090B Fuzhou FUJIAN RIBAO in Chinese 27 Apr 93 p 5

[Excerpts] Fujian Province, lacking in petroleum and coal reserves but relatively rich in water resources, has accelerated its development of hydroelectric power while quickening the pace of economic development. Last year alone, small and medium-scale hydroelectric power stations under construction in the province reached a total capacity of 500,000 kilowatts—a breakthrough—with an annual power generating capacity of 5 billion kilowatt-hours, an all-time record high. [passage omitted]

Medium-scale hydroelectric power stations under construction in the province last year reached a total of nine for a total power generating capacity of 370,000 kilowatts. Two of them have been completed and put into operation.

The project to bring full electrification to 22 rural counties is proceeding steadily. In bringing electricity to rural villages, the provincial authority fully implements the spirits as documented in the various papers of the State Department and the provincial government. After 2 years of hard work and self-reliance, encouraging results have been achieved. Last year alone, these rural counties invested a total of 0.17 billion yuan in power generation investments and installed an additional capacity of 45,000 kilowatts with another 183,000 kilowatts under construction. The move to develop electricity in rural villages and townships is running in high gear. Some 40 to 50 power stations each with a capacity of over 200 kilowatts are either under construction or being planned in the province. Local power generation stations in the province, according to statistics, have a total capacity of 1.38 million kilowatts, of which 54 counties/townships each have a hydroelectric power capacity of 100,000 kilowatts. This puts Fujian Province in the leading position in the nation in terms of either hydroelectric power generation capacity or actual power generation.

No. 1 Unit at Geheyan Now Operational

936B0090A Beijing RENMIN RIBAO OVERSEAS EDITION in Chinese 5 Jun 93 p 1

[Article by reporter Gung Dafa]

[Text] Wuhan, 4 June—At 11.46 this morning, the first generator of Geheyan hydroelectric power station, after 72 hours of trial run, was officially put into operation.

The Geheyan hydroelectric power station is located in Changyang County, Hubei Province. It is the first large power station developed in the series of cascade power stations planned on the tributaries of the Qing Jiang. It is about 50 kilometers from the Gezhouba power station on the Chang Jiang. The Geheyan power station consists of four 300,000-kilowatt turbine generators. The project is financed by a consolidated Canadian government loan of U.S.$108,000,000. The completion of this flood control and regulation dam/power station will greatly relieve the power crunch in Hubei and central China and will improve the quality and quantity of the power grid of the Gezhouba power station and even the central China power grid.

Builders of the Geheyan power station were able to put the first power generator into operation ahead of schedule. It is the first power station to be completed among several of the million-kilowatt power stations the government has planned to bring into operation this year. It was put into operation 6 months and 25 days ahead of the government's completion schedule. This means an additional 0.6 billion kilowatt-hours or more of power generated, a direct economic benefit of 0.22 billion yuan, and an additional industrial output of 3 billion yuan. It took only 5 years and 5 months from January 1988 when the main engineering work began to the time when the first power generator went into operation. This is a record time in the nation's building of large hydroelectric power stations.

850MW Xiaoshan Plant Taking Shape

93P60285A Hangzhou ZHEJIANG RIBAO in Chinese 26 Apr 93 p 1

[Text] The Xiaoshan power plant, a major construction project in Zhejiang Province during the Eighth 5-Year Plan; since construction began in March 1992, within 1 year, the main plant building, control room, coal pier, the No. 1 cooling tower, and the 180-meter-high stack have been completed and today the No. 1 generator is in the debugging stage. The plant could be generating electricity before the end of the year.

The Xiaoshan power plant has an installed capacity of 850,000 kilowatts, with two 125,000-kilowatt generators being installed in the first stage of construction. It marks the first joint venture in China involving a province and city. The electricity and profits will be shared by the Provincial Electric Power Bureau and the city of Xiaoshan.

China Steps Up Development of Eastern Ningxia Coal Fields

936B0079A Beijing LIAOWANG ZHOUKAN [LIAOWANG WEEKLY] in Chinese 10 May 93 pp 18-19

[Article by Wu Guoqing [0702 0948 3237]]

[Text] The rapid pace of China's economic development is fueling the development of the energy and transportation industries, especially the westward energy development strategy.

Within the expanse of the Ningxia Hui Autonomous Region, a key construction project of the Eighth 5-Year Plan (1991-1995), the eastern Ningxia coal field (AKA Lingwu coal field), driven by pressure from the east, is taking shape.

Coal Reserves Rival the Three Northeastern Provinces

In the loess hills of eastern Ningxia there lies an ocean of coal. Extending 130 kilometers north/south and 100 kilometers east/west, covering an area of 13, 000 square kilometers, stands a confirmed coal reserve of 27.3 billion tons, about equal that of the total existing reserves in the three northeastern provinces. It is predicted that as prospecting efforts proceed, 6.3 billion more tons of reserves will be found.

This coal field lies primarily in Lingwu County and extends into Yanchi and Tongxin Counties, and designated prospecting areas are Hengcheng, Suishijing, Majiatan, and Jijiajing.

Prospecting data shows this coal field's coal bearing strata to be of Jurassic Yan'an formation with up to 18 exploitable strata averaging over 20 meters thick, and the primary coal extraction seams averaging 8.06 meters deep. The coal, being of excellent quality, can be used as high-grade coal for power, for coal gasification, carbon processing, and multi-purpose uses including domestic consumption.

Historically, Lingwu County was called Lingzhou, the place where Li Heng replaced his father on the throne and took the dynastic title Tang Su Zong. Coal has been extracted there for a thousand years. In the period of the Western Xia, coal was being used in the porcelain kilns, and the ruins of coal and porcelain kilns are still to be found today. During the Qing Dynasty fragments of coal from the kilns were used in the royal palace, and small civilian kilns are still in use today.

Transportation is convenient in the eastern Ningxia coal field and conditions for development are excellent. The coal field is close to the Bao- Lan Rail line, the Bao-Lan highway, and the Huang He; transportation is developed and shipping is easy. The mining district is also situated on a sandy prairie and loess hill region where the terrain is open, facilitating construction. In the center of the coal fields is the Yinchuan plain where agriculture is well developed. Conditions are good for setting up a mining district.

The geological structure and hydrological conditions within the coal field are said to be uncomplicated, the coal seams are consistent, near the surface (the thickness of the Quaternary cover is .64 to 24.2 meters), and considerable geological exploration has been done there. The tops and bottoms of the coal seams are pelite bound sandstone, making it easy to control the seam ceilings while extracting coal.

Plans are to start the early stage development of the Lingwu mining district in the Eighth 5-Year Plan. The mining district was divided into three prospecting areas: the Suishijing, Yuanyanghu, and Hengcheng, and close to 10 billion tons of coal reserves have been confirmed.

It is clear from the overall plan of the Lingwu mining district, which has already been approved nationally, annual production capability from the first-stage construction will be on a scale of 11.6 million tons at a total investment of 2.6 billion yuan, and in the out years, annual production will reach 30 million tons.

According to the national plan and design, Lingwu mining district will be a very large environmentally pleasing and attractive mining district with modernized standards, moderate manpower requirements, highly efficient, safe and reliable, economical, and management will be progressive.

A Fever of Development

Several dozen kilometers southwest of Yinchuan in Lingwu mining district there unfolds a scene of furious activity.

Fervent construction activity is underway along the full length of a 50- kilometer first-class highway from Yinchuan to Guyaoci that is expected to be finished by July next year, and a 70-kilometer rail line through the mining district at an investment of nearly 400 million yuan.

A 110kV power transmission line has just been turned on, and a 220kV line is under construction.

A 47-kilometer water supply line that will carry a daily supply of over 30,000 cubic meters of water may be supplying water by October this year.

A large-scale mine with an estimated annual output capability of 2.4 million tons, the Lingxin mine, is actively under construction and will go into production at the end of next year.

According to the Chief of the Lingwu Mining Bureau, Bu Zhaofu [0592 2507 4395], construction of the Lingwu mining district will be done in two steps. First, two large-scale mines will be built in the latter 8-year period of the Eighth and Ninth 5-Year Plans: the 2.4 million ton Lingxin mine and the 3 million ton Yangyangwan mine

for a combined total annual production capability of 5.4 million tons. At the same time, the main facilities of the mining district, the electric power, water and transportation lines will be completed, and in permanent working order.

And second, From 1997 to 2003, the extra large-scale Zaoquan coal mine with an annual output capability of 5 million tons will be built. Added on to that will be the local coal mines with a collective production capacity of 1.2 million tons. In time, the whole Lingwu mining district will reach an annual output capability of 11.6 million tons.

The mining district will put into action a coal-oriented guidance policy supporting a unified program, singular design, staged construction for full-scale development from small mines to large mining centers, for a multitude of uses under diversified management.

The Lingwu mining district wound up its small mine start-up mission, and has entered the large-scale development construction stage. The mining district has already built the Lingxin No's 1 and 2 small mines with production capabilities of 300,000 and 450,000 tons respectively. One part of the Yangyangwan mine with an annual output capability of 300,000 tons will become operational next year. Construction of one large Lingxin mine with an annual output capacity of 2.4 million tons has begun, and another large-scale Yangyangwan mine with an annual output of 3 million tons is in the early stage of preparation for construction scheduled to begin next year; engineering for the mining district water, electricity, transportation and production is proceeding on all fronts, the urban construction program is finished, and housing construction is bustling.

In order to avoid further burdening construction, as soon as construction began, the Lingwu Mining Bureau began to change itself into a coal industry group enterprise, opening up offices in provinces and regions throughout the country, and it is said that in Hainan Province, in cooperation with foreign commercial interests, a 3-star hotel and trading corporation have been opened up; in Tacheng, Xinjiang a port industrial trading corporation, an ephedrine factory, a licorice paste factory, and a cooperatively built paper mill have been set up in cooperation with local departments; an activated charcoal factory was built in Wushun, Liaoning, and a commercial trading outlet was opened up at Dalian; and also in cooperation with foreign commercial interests, a large-scale vehicle repair and parts factory and new-style lumber mill were built in Yinchuan.

Bu Zhaofu said national investments for the construction of the mining district were increased to nearly 300 million yuan with guarantees for both material and technical support. The Lingwu Mining Bureau is believed to be fully capable of completing the development mission, and handling comprehensive management of coal, electricity, and transportation, coal processing and tertiary industries and keep development and construction of the coal fields on the fast track.

Plans To Accelerate Use of Foreign Funds

Bureau Chief Bu Zhaofu said the accelerated national economic development puts pressure on coal, but the Lingwu mining district development is falling behind; and the Lingwu Mining Bureau plans to use outside funds to speed up its development.

The large Daba coal-powered plant with an installed capacity of 2,400MW, mainly for the supply of power within Ningxia, is programmed for the first-stage development of Lingwu coal field. The first-stage construction of installed capacity of 600MW is now operational, and for the second-stage construction of equal capacity, one 300MW unit will be installed this year, and one the following year. With the added industrial and domestic coal requirements coming on, the Lingwu mining district urgently needs to reach an annual production capability of 5 to 6 million tons.

Also, not long ago, the Ningxia Hui Autonomous Region Government decided to build a thermal power base in Ningxia with a total installed capacity of 10,000MW and send power to Sichuan and Hubei where there is a shortage of electricity. This means Ningxia must increase its annual output of coal by 30 million tons, and this must be undertaken and completed by the Lingwu Mining Bureau in 20 to 30 years.

In order to speed up the development process, Lingwu Mining Bureau decided to look for outside funding. Plans were made for bilateral cooperation with foreign commercial interests:

1. Use foreign funds to speed coal field development. If there is foreign commercial interest in the development of Lingwu coal field, then Lingwu Mining Bureau can engage in joint ventures or cooperative endeavors to build parts of the large or extra-large mines, and at the same time pursue preferential foreign government loans.

2. Use foreign funds to develop coal processing, build full-scale projects and develop tertiary industries. Two construction projects are now in search of foreign commercial cooperation. (1) Foreign funds are needed to build a pit-mouth thermal power plant for which a 400MW installation is planned for the first stage, and using local coal to produce electricity will be efficient and cheap. The total estimated investment required will be 500 million yuan. The Lingwu Mining Bureau will provide the grounds, technology, and raw materials, and the foreign partner will provide funds and facilities. An additional 600MW unit is planned for the future, which will use the 10 percent low-grade coal that will be produced for local consumption. The electricity not used for livelihood and production in the mining district, can be sold outside. (2) Foreign funds are needed to build a middle-sized cement plant on a scale from 5,000 to 120,000 tons at an investment of 150 to 500 million yuan. Within the mining district there is high-grade limestone which can be used to produce high-grade cement, and it will be very economical to burn coal produced on location. Thirty percent of its output can be used by the mining bureau. It is estimated that when the project is finished profits can rise to an output value of 20 to 25 percent.

Daqing Output Could Stabilize at 50 Million Tons a Year to 2000

936B0082C Beijing RENMIN RIBAO OVERSEAS EDITION in Chinese 20 May 93 p 2

[Article by Gao Shuhua [7559 3219 5478] and Jing Bo [2529 2276]]

[Text] Daqing, China's largest petroleum base, broke the 50-million-ton mark of crude production in 1976 and maintained the 50-million-ton record for 17 consecutive years; it was the longest stable production record in the world for an oil field of this type.

Petroleum experts say that large oil fields in the world similar to Daqing usually maintain their peak production for 7 to 8 years and then rapidly decline. Daqing, on the other hand, is expected to maintain its output at 55 million tons up to 1995 and 50 million tons up to the year 2000.

The reason that Daqing was able to maintain its high level of output for 17 years is the continually improving petroleum development technology. Statistics showed that over the past 30 years Daqing has developed and promoted more than 40,000 new technologies; 10 of them have reached world standards, the whole system technology development in particular is leading the world.

Daqing is the world's largest continental deposition oil field, its characteristics are totally different from the world's large ocean deposition oil fields and it is more difficult to develop. To develop the Daqing oil, China pioneered the water injection method, now widely used in the world. Systematic deployment of high technology for different stages of water content has maintained the high output of the oil field.

The primary oil production at Daqing relies on the natural pressure underground and the automatic flow of the wells. After the natural pressure wears off, a secondary production technique is based on a combination of water injection and pumping. Today, a third production technique is used in areas that had gone through the first two stages. The third production technique led to another 10 million tons of crude per year in these areas, which accounts for one-fourth of China's annual oil production.

It was said that oil strata less than 0.5 meter thick are generally declared "dead" in foreign countries due to limitation in production technology. At Daqing, this type of thin oil strata accounts for one-fourth of all the oil strata. To develop this oil, they initiated and developed the "restricted flow fissure method" and turned these thin oil layers into a wealth that maintained the stable output. In the 1980's Daqing drilled more than 1,000 wells each year. Two-thirds of the oil produced by the new wells came from the thin layers, which is equivalent to another large oil field.

In the meantime Daqing is also actively exploring peripheral oil fields; all five peripheral oil fields discovered to date have reserves greater than 100 million tons.

Daqing Petrochemical Production Reaches New Level

936B0082A Beijing RENMIN RIBAO OVERSEAS EDITION in Chinese 21 May 93 p 1

[Article by Jin Bo [2529 2276] and Gao Shuhua [7559 3219 5478]]

[Text] The Daqing oil field, which accounts for the bulk of China's petroleum production, has now become China's major petrochemical production base.

The large oil and gas processing plants in Daqing include the Daqing Petrochemical General Company, the Daqing Linyuan Oil Refinery, the Helongjiang Petrochemical Plant, and the Daqing Chemical Supplement Plant. Among them, the Daqing Petrochemical General Company has become one of China's 500 top enterprises.

In addition, Daqing has in recent years built large-scale chemical fibers plant, chemical fertilizer plant and ethylene facility. These plants can produce more than 100 varieties of oil products and organic chemicals. The main products include gasoline, kerosene, and diesel oil, for a total of 250 brands of 74 product lines, with 73 of those state-certified and exported to 23 countries and regions.

According to Daqing authorities, Daqing will in the coming years build facilities for producing styrene, polypropylene, crude oil catalysts, and light hydrocarbons. Daqing is also refining and reprocessing petrochemical raw materials, renewing their product line, and improving the quality and quantity of plastic, fertilizer, and other daily products.

These reporters learned that Daqing plans to increase the volume of petrochemicals from the present 6.2 billion yuan to 12 billion yuan in 1995.

Outlook Good for Shengli Production

936B0082B Beijing RENMIN RIBAO OVERSEAS EDITION in Chinese 20 May 93 p 1

[Article by Hou Yanfeng [0186 0917 5762]]

[Text] In Shengli oil field in Shandong, the offshore oil field with the largest verified oil and gas reserve, the Chengdao oil field, has advanced from the exploration stage to actual mining.

Local oil experts pointed out that large-scale drilling in the Chengdao oil field brings a good outlook for the 29-year-old Shengli oil field.

According to Director Lu Renjie [7120 0086 0267] of the Shengli Petroleum Management Bureau, prospecting in

the last 2 years has verified that there are 36 square kilometers of oil-bearing area in the Chengtian oil field and the geological reserve of oil per annum accounts for 30 percent of the new reserve in Shengli. It potentially has several hundred million tons of oil. It is estimated that the output of Chengdao oil field by 1995 will be more than 1 million tons.

The Shengli oil field is China's second largest oil field. Since 1964 there has been large-scale prospecting and development at Shengli which made it an important petroleum base in east China. To date, a total of 67 different types of oil and gas fields with a geological reserve of 1 billion tons have been verified in an area of 37,000 square kilometers in Shandong Province. These reserves accounted for more than one-fifth of new geological reserves of petroleum in China for that period. In the last 4 years the crude oil output of Shengli has been stabilized at a level of 33 million tons.

Concurrent to oil and gas exploration in beach and offshore areas, major discoveries have also been made in inland exploration. It was said that a 3-month exploration this year has verified an oil field with tens of million of tons of geological reserves in Linnan; the potential reserve could be in the billions of tons. Millions and tens of millions of tons of oil reserves have been verified in Jiyang, Dongying, and Huimin. Rich oil and gas reserves have been found in Gudong in a 100-square-kilometer area along the Huang He. Using new and high-tech methods, hidden oil reserves in old oil fields were gradually uncovered. The actual output of many oil fields have become several times the prospected reserve.

Experts stated that, with intensive exploration, the oil reserve area of Shengli will be expanded from the current 37,000 square kilometers to about 90,000 square kilometers. The long-term reserve is expected to be about twice the verified reserve.

Seismic Technology Used To Develop Oil Fields

936B0084B Beijing RENMIN RIBAO OVERSEAS EDITION in Chinese 19 May 93 p 2

[Article by reporter Zhuo Peirong [0587 1014 2837]]

[Text] Beijing, 19 May (XINHUA)—The China Petroleum and Natural Gas Corporation and State Seismology Bureau will increase S&T cooperation between their petroleum and seismic operations, to use seismology to increase oil production, to cooperate in building a seismology network, and to jointly disseminate the application of their scientific achievements.

This will be a continuation and further development of 7 years of S&T cooperation between petroleum and seismology departments, which has not only resulted in the development of seismology S&T, but has solved many major technical problems in the oil industry, and won many awards for breaking new ground in S&T and economic cooperation.

The State Seismology Bureau Engineering Dynamics Research Institute and Jilin Oil Field Drilling Technology Research Institute cooperated in the development of seismic extraction technology, with recent successful advancements, which not only raised the crude oil output of oil fields with shallow strata several hundred meters deep, but made oil fields with strata 1,000 meters deep more productive, including some shafts where it was difficult to continue exploitation, and even restored some that had dried up. Oil extraction by this means was faster, more productive, improved the quality of oil, and increased the rate of new wells in production by 1 to 30.

The State Seismology Bureau Geological Research Institute and Dagang Petroleum Bureau have cooperated in the development of the "relationship between the stress-field structure of Dagang oil field" and made remarkable improvement in well distribution. As a result of the new distribution, production from water injection wells exceeded goals, and set a pattern for the distribution of shafts at the Dagang oil field's new zone.

Seismology and petroleum departments have also cooperated with the Beijing Huaneng Earth Sciences Corporation in the development of and made advancements in the use of oil emulsifying technology. Tests at Henan, Dagang, and Liaohe oil fields showed increased daily output of crude oil from 5 to 13 tons, and initial evaluation shows increased economic performance by as much as 1 to 9.

Encouraged by past successes, the two departments agreed, according to the needs of the market economy, seismic technology, and development of the petroleum industry, to invest in the organization and development of a high-tech oil-seismology industry based on their S&T strengths and their run of sucesses in deep-earth and surface S&T, and expand into other economic areas.

Qinshan Update

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[Text] Hangzhou, 17 Apr (XINHUA)—The peripheral monitoring system for the Qinshan nuclear power plant, the first nuclear power plant built on the mainland of China, has been functioning up to its designed specifications for over 2 years, and has successfully concluded its environmental background radiation checks, routine operating surveillance, and external emergency monitoring exercises. Experts from the State Environmental Protection Bureau and other organizations around the country who attended the 14 April examination and acceptance meeting for the monitor's functional checks, uniformly believe that an important step has been reached for environmental radiation protection in China, and it shows that on the first continuous operation, surveillance monitoring performed up to international standards for surveillance monitoring of nuclear power plants. The State Environmental Protection Bureau presented a commendation to the Zhejiang Radiation Monitoring Station which was responsible for the job.

Now that China has developed a nuclear power industry, the question of how to conduct strong and effective controls to protect the environment against nuclear contamination and keep nuclear power flourishing is a matter of widespread public concern. In accordance with the "The Chinese People's Republic Environmental Protection Law" and relevant national environmental protection regulations, Zhejiang established the first radiation monitoring station in China in 1987 for continual monitoring of the Qinshan nuclear power plant.

The Qinshan nuclear power plant peripheral monitoring system is composed of three systems: the guardian monitoring system, a laboratory monitoring system, and a mobile monitoring system, and all technical specifications meet international conventions. The guardian monitoring consists of six automatic continuous-monitoring high-voltage ion chambers set up at six locations surrounding Qinshan nuclear power plant that record data every 30 seconds, process it through a computer and transmit it the main station at Hangzhou. The laboratory monitoring system at Hangzhou reads and measures specific and overall radiation of various environmental media. Special environmental monitoring vehicles maintain non-stop year-round mobile monitoring of radiation in the environment around the nuclear power plant.

Experts say that the first nuclear power plant surveillance monitoring system not only fills the void for monitoring environmental radiation in China, but also brings China's peripheral monitoring technology up to international standards.